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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/588,552	06/07/2000	Kazuhiro Kawashiri	P107317-00006	9166

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EXAMINER

LONG, HEATHER R

ART UNIT	PAPER NUMBER
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2615

3

DATE MAILED: 12/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

TS

Office Action Summary

Application No.

09/588,552

Applicant(s)

KAWASHIRI, KAZUHIRO

Examiner

Heather R Long

Art Unit

2615

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 June 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 13-16 is/are rejected.
- 7) ☒ Claim(s) 11 and 12 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 June 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Drawings

2. Figure 7 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claim 1 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Iizuka (U.S. Patent 5,287,192).

Regarding claim 1, Iizuka discloses in Figs. 1, 2, 3, and 4 a solid state image pickup device (7) comprising: a plurality of photoelectric conversion elements (1) for converting light into electric charges, the photoelectric conversion elements (1) being uniformly disposed on a two-dimensional plane in

vertical and horizontal directions; a plurality of vertical charge transfer paths (3) for transferring electric charges to a downstream side in the vertical direction, the vertical charge transfer path (3) being disposed adjacent to vertically and uniformly disposed photoelectric conversion elements (1); a read gate (2) for reading electric charges from each photoelectric conversion element (1) to the adjacent vertical charge transfer path (3); vertical addition means for adding electric charges of two photoelectric conversion elements (1) on the vertical charge transfer path (3), by controlling the read gates (2) and the vertical charge transfer path (3) to read electric charges from some of the plurality of photoelectric conversion elements (1) to the vertical charge transfer path (3), transfer the read charges on the vertical charge transfer path (3) to the downstream side in the vertical direction, and read electric charges from others of the plurality of photoelectric elements (1) on the downstream side to the vertical charge transfer path (3); a horizontal charge transfer path (5) for transferring electric charges to a downstream side in the horizontal direction, the horizontal charge transfer path (5) being disposed adjacent to one ends of the plurality of vertical charge transfer paths (3); horizontal addition means for adding electric charges transferred from two of the vertical charge transfer paths (3), on the horizontal charge transfer path (5), by controlling the transfer gate and the horizontal charge transfer path (5) to transfer electric charges from some of the plurality of vertical charge transfer paths (3) to the horizontal charge transfer path (5), transfer the electric charges on the horizontal charge transfer path (5) to the

downstream side in the horizontal direction, and transfer electric charges from others of the plurality of vertical charge transfer paths (3) on the downstream side to the horizontal charge transfer path (5). It is inherent that there is a transfer gate for transferring electric charges on the vertical charge transfer paths (3) to the horizontal charge transfer path (5) (col. 2, lines 34-53; col. 3, lines 39-60; and col. 4, lines 9-18).

Regarding claim **13**, Iizuka discloses in Figs. 1, 2, 3, and 4 a control method for a solid state image pickup device (7) having a plurality of photoelectric conversion elements (1) for converting light into electric charges, the photoelectric conversion elements (1) being uniformly disposed on a two-dimensional plane in vertical and horizontal directions, a plurality of vertical charge transfer paths (3) for transferring electric charges to a downstream side in the vertical direction, the vertical charge transfer path (3) being disposed adjacent to vertically and uniformly disposed photoelectric conversion elements (1), a horizontal charge transfer path (5) for transferring electric charges to a downstream side in the vertical direction, the vertical charge transfer path (3) being disposed adjacent to vertically and uniformly disposed photoelectric conversion elements (1), a horizontal charge transfer path (5) for transferring electric charges to a downstream side in the horizontal direction, the horizontal charge transfer path (5) being disposed adjacent to one ends of the plurality of vertical charge transfer paths (3), the method comprising the steps of: (a) reading electric charges from some of the plurality of photoelectric conversion elements

(1) to the vertical charge transfer path (3); (b) transferring the electric charges on the vertical charge transfer path (3) to a downstream side in the vertical direction; (c) reading electric charges from others of the plurality of photoelectric conversion elements (1) on the downstream side to the vertical charge transfer path (3) and adding the read electric charges to the electric charges transferred to the downstream side; (d) transferring electric charges from some of the plurality of vertical charge transfer paths (3) to the horizontal charge transfer path (5); (e) transferring the electric charges on the horizontal charge transfer path (5) to a downstream side in the horizontal direction; and (f) transferring electric charges from others of the plurality of vertical charge transfer paths (3) on the downstream side to the horizontal charge transfer path (5) and adding electric charges from two or more vertical charge transfer paths (3) on the horizontal charge transfer path (5) (col. 2, lines 34-53; col. 3, lines 39-60; and col. 4, lines 9-18).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 2-4 and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iizuka as applied to claim 1 above, and further in view of Kijima et al. (U.S. Patent 6,661,451).

Regarding claim 2, Iizuka differs from claim 2 in that claim 2 further requires a solid state image pickup device, wherein the plurality of photoelectric conversion elements can convert light of each of a plurality of colors into electric charges and the vertical charge transfer path and the horizontal charge transfer path adds electric charges of a same color.

Referring to the Kijima et al. reference, Kijima et al. discloses in Figs. 7 and 8 a solid state image pickup device, wherein the plurality of photoelectric conversion elements can convert light of each of a plurality of colors into electric charges and the vertical charge transfer path and the horizontal charge transfer path adds electric charges of a same color (col. 7, lines 60-69; col. 8, lines 17-47).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined the teachings of Kijima et al. and Iizuka and only have added electric charges of the same color together in order to create an image free from considerable moiré.

Regarding claim 3, Kijima et al. discloses in Figs. 7 and 8 a solid state image pickup device, wherein the plurality of photoelectric conversion elements uniformly disposed in the vertical direction can convert light of each of at least two colors into electric charges; and the vertical addition means adds electric

charges of a same color by controlling the read gate and the vertical charge transfer path to read electric charges from some of plurality of photoelectric conversion elements uniformly disposed in the vertical direction to the vertical charge transfer path by a first read operation, thereafter transfer the read electric charges in the vertical direction to positions adjacent to others of the plurality of photoelectric conversion elements on the downstream side capable of converting light of the same color not read by the first read operation into electric charges, and read the electric charges from the others of the plurality of photoelectric conversion elements by a second read operation to add the read electric charges transferred to the positions (col. 7, lines 60-69; col. 8, lines 17-47).

Regarding claim **4**, Kijima et al. discloses in Figs. 7 and 8 a solid state image pickup device, wherein the photoelectric conversion elements from which the electric charges are read by the second read operation are spaced at least by one photoelectric conversion element in the vertical direction toward the horizontal charge transfer path, from the photoelectric conversion elements from which the electric charges are read by the first read operation (col. 9, lines 11-14).

Regarding claim **14**, Kijima et al. discloses in Figs. 7 and 8 a control method for a solid state image pickup device, wherein the plurality of photoelectric conversion elements can convert light of each of a plurality of colors into electric charges and the steps (c) and (f) adds electric charges of a same color (col. 7, lines 60-69; col. 8, lines 17-47).

Regarding claim **15**, Kijima et al. discloses a control method for a solid state image pickup device, wherein the plurality of photoelectric conversion elements uniformly disposed in the vertical direction can convert light of each of at least two colors into electric charges; step (b) transfers the read electric charges in the vertical direction to positions adjacent to others of the plurality of photoelectric conversion elements on the downstream side capable of converting light of the same color not read by step (a) into electric charges; and step (c) reads the electric charges from the others of the plurality of photoelectric conversion elements on the downstream side to add the read electric charges to the electric charges transferred to the positions (col. 7, lines 60-69; col. 8, lines 17-47).

Regarding claim **16**, Iizuka in view of Kijima et al. discloses a control method for a solid state image pickup device, wherein step (d) transfer added electric charges of a same color from some of the plurality of vertical charge transfer paths to the horizontal charge transfer path; and step (f) transfers electric charges of the same color from others of the plurality of vertical charge transfer paths on the downstream side to the horizontal charge transfer path and adding the electric charges of the same color transferred from two vertical charge transfer paths (Iizuka: Figs. 2, 3, and 4; Kijima et al.: col. 9, lines 11- 14).

7. Claims 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iizuka as applied to claim 1 above, and further in view of Nakashiba (U.S. Patent 5,920,346).

Regarding claim **5**, Iizuka differs from claim 5 in that claim 5 further requires a solid state image pickup device, wherein the transfer gate includes a plurality of control gates extending in parallel in the horizontal direction, the plurality of control gates crossing the plurality of vertical charge transfer paths.

Referring to the Nakashiba reference, Nakashiba discloses in Figs. 5 and 6 a solid state image pickup device, wherein the transfer gate includes a plurality of control gates (11-13) extending in parallel in the horizontal direction, the plurality of control gates crossing the plurality of vertical charge transfer paths (6-1, 6-2) (col. 3, lines 17-21).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made combined the teachings of Nakashiba with Iizuka in order to provide a two-dimensional CCD image sensor free from vertical black streaks.

Regarding claim **6**, Nakashiba discloses in Figs. 5 and 6 a solid state image pickup device, wherein the plurality of control gates (11-13) include a control gate which covers areas different in the vertical direction of one and another of the plurality of vertical charge transfer paths (6-1, 6-2).

Regarding claim **7**, Nakashiba discloses in Figs. 5 and 6 a solid state image pickup device, wherein the plurality of control gates (11-13) include a control gate which covers areas different in the vertical direction of one and another set of a plurality of vertical charge transfer paths (6-1, 6-2) adjacent in the horizontal direction.

Regarding claim **8**, Nakashiba discloses in Figs. 5 and 6 a solid state image pickup device, wherein the control gates (11-13) include a plurality of first and second layer polysilicon electrodes formed above the vertical charge transfer paths (6-1).

Regarding claim **9**, Nakashiba discloses in Figs. 5 and 6 a solid state image pickup device, wherein the plurality of second layer polysilicon electrodes (12) include a second layer polysilicon electrode formed only above the first layer polysilicon electrode (11, 13) above some of the plurality of vertical charge transfer paths (6-1).

Regarding claim **10**, Nakashiba discloses in Figs 5 and 6 a solid state image pickup device, wherein the plurality of first layer polysilicon electrodes (11, 13) include a first layer polysilicon electrode (11) having different lengths in the vertical direction above the different ones of the plurality of vertical charge transfer paths (6-1, 6-2).

Allowable Subject Matter

8. Claims 11 and 12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter: prior art does not teach or fairly suggest a solid state image pickup device, wherein:

- a. The vertical charge transfer path includes a first conductivity type semiconductor layer for transferring electric charges accumulated in the photoelectric conversion element, a first vertical charge transfer path having second conductivity type semiconductor layers in the first conductivity type semiconductor layer for forming a potential barrier in two regions different in the vertical direction, and a second vertical charge transfer path having a second conductivity type semiconductor layer in the first conductivity type semiconductor layer for forming a potential barrier in one of the two regions on a downstream side; the transfer gate includes at least first to fourth control gates remote in this order from the horizontal charge transfer path, the first to fourth control gates extending in the horizontal direction above the plurality of vertical charge transfer paths; the first and third control gates are formed above the first conductivity type semiconductor layer; and the second and fourth control electrodes cross the first and second vertical charge transfer paths in the two regions.
- b. The second and third control electrodes are connected in common.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a. Savoye et al. (U.S. Patent 5,880,777) discloses a solid state image pickup device with horizontal and vertical addition means.

b. Kawamura (U.S. Patent 6,185,270) discloses a solid state image pickup device, wherein the transfer gate has a plurality of control gates that extend in parallel in the horizontal direction, the control gates crossing the plurality of vertical charge transfer paths.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Heather R Long whose telephone number is 703-305-0681. The examiner can normally be reached on Mon. - Thurs.: 7:00 am - 4:30 pm, and every other Fri.: 7:00 am - 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Christensen can be reached on (703) 308-9644. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4700.

HRL
December 22, 2003


NGOC-YEN VU
PRIMARY EXAMINER